DWORSHAK IMPACTS/M&E & BIO-INT RULE CURVES 8740700

SHORT DESCRIPTION:
Gather thermal/physical/chemical data, primary productivity, zooplankton and benthic data for M&E of impacts from Dworshak operations and use these data to formulate biological/integrated rule curves.

SPONSOR/CONTRACTOR: NPT
Nez Perce Tribe
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SUB-CONTRACTORS:
EcoAnalysts, Moscow, ID, for aquatic macroinvertebrate analysis, Washington State Water Research Center, Pullman, WA, or AquaID for zooplankton analysis.

GOALS

GENERAL:
Supports a healthy Columbia basin, Maintains biological diversity, Increases run sizes or populations, Provides needed habitat protection

RESIDENT FISH:
Research, M&E

NPPC PROGRAM MEASURE:
10.3C.6 & 5.5A.1 & 5.5A.2

RELATION TO MEASURE:
The project is specifically designed to collect and analyze data for incorporation in the development of biological/integrated rule curves for Dworshak Reservoir (Measure 10.3C.6). The project also provides for research, monitoring and evaluation activities needed to determine potential impacts of salmon and steelhead flow operations on resident fish in and around Dworshak Reservoir (Measures 5.5A.1 & 5.5A.2)

TARGET STOCK	LIFE STAGE	MGMT CODE (see below)
Smallmouth bass		
Kokanee		
Westslope cutthroat trout		
Bull trout		

AFFECTED STOCK	BENEFIT OR DETRIMENT
Black crappie	Beneficial
Largemouth bass	Beneficial

BACKGROUND

STREAM AREA AFFECTED
Stream name:
North Fork Clearwater River (Dworshak Reservoir)
Stream miles affected:
53.6
Hydro project mitigated:
Dworshak Dam and Reservoir, ID

LAND AREA INFORMATION
Subbasin:
Clearwater
Land ownership:
public
Acres affected:
17,090
Habitat types:
Reservoir

HISTORY:
The Corps of Engineers supplied funding for the Washington Water Research Center, Pullman, WA, to conduct primary productiv

ity, zooplankton and water quality studies during FY 1995. The primary productivity and water quality work was a continuation of work funded by BPA under 8770700 in FY 1993 and 1994. Project 9740700 plans to continue to provide equipment and personnel support for these activities. Biological information was used extensively in the BPA/USACE/BOR System Operation Review (Final November 1995). The SOR provided a broad-based, multidisciplinary approach to evaluating over 90 alternative operation strategies for the FCRPS. Project data and analysis for the Resident Fish Appendix of the SOR EIS was a major non-biological product that was a project focus pre-1996.

BIOLOGICAL RESULTS ACHIEVED:

As a result of recommendations in a 1993 project report prepared jointly by the Nez Perce Tribe and the Idaho Department of Fish and Game, the stocking of rainbow trout in Dworshak Reservoir for resident fish mitigation has been limited pending investigation of rainbow trout-cutthroat trout hybridization. Based on project studies, the 12-inch minimum size limit for smallmouth bass was withdrawn, thereby expanding harvest opportunities in Dworshak Reservoir for this popular self-sustaining non-native species.

PROJECT REPORTS AND PAPERS:

Statler, D.P. 1988, 1989, 1990. Dworshak Investigations: trout, bass and forage species. Nez Perce Tribe Department of Fisheries Resources Management, Annual Report to Bonneville Power Administration, Contract DE-AI79-87BP35165, Project 87-407, Portland, OR.

Juul, S.T.J, and M.A. Hagerman. 1993. Primary productivity evaluation of Dworshak Reservoir: first interim report. Prepared for the Nez Perce Tribe, WSU Project Number 11W-3815-2857, Pullman, WA.

Juul, S.T.J. 1996. A limnological reevaluation of Dwoshak Reservoir, Idaho. A Progress Report Prepared for the Nez Perce Tribe and the U.S. Army Corps of Engineers, WSU Project Numbers 11W-3815-2857 and 11W-3998-2628, Pullman, WA.

Maiolie, M.A., D.P. Statler, and S. Elam. 1993. Dworshak Dam impact assessment and fishery investigation and trout, bass, and forage species. Final Report. Bonneville Power Administration, Portland, OR.

ADAPTIVE MANAGEMENT IMPLICATIONS:

Knowledge gained from this program will aid in the adaptive management for consideration of reservoir fish resource needs in conjunction with downstream needs for anadromous fish, flood control and power production. Biological information generated from this project data was used to evaluate over 90 operation startegies for the FCRPS as part of the SOR. These analyses indicated that operational criteria resulting in relatively stable pool levels are most conducive to maintaining productivity of the Dworshak Reservoir ecosystem. This information has been and is being applied within the TMT process established as part of the NMFS 1995 Biological Opinion on operation of the FCRPS. It can be concluded that, within the broader program management framework, biological information from thjis project has increased the awareness and sensitivity of the TMT process to resident fishery resources.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

The project intends to achieve: conservation/enhancement of baseline (yet to be determined) primary productivity, zooplankton productivity and benthic productivity; rearing habitat and food resources for the conservation of bull trout and westslope cutthroat trout within the North Fork Clearwater Basin; a stable population of kokanee at 30-50 age-2 kokanee/hectare; successful natural reproduction of smallmouth bass; a target PSD of 30 and relative weight of 100 for smallmouth bass.

CRITICAL UNCERTAINTIES:

Biological/integrated rule curve development through data collection assumes that changes in primary and secondary production attributed to dam operations can be isolated and detected. A risk is that, once identified, the biological/inregrated rule curves are not implemented.

BIOLOGICAL NEED:

The underlying need for this project is to maintain the productive health of Dworshak Reservoir for resident fish while serving other multi-purpose needs, such as flood control, power production and flow augmentation for anadromous fish. The bottom line is to identify an operational strategy for Dworshak Dam to mimic the downstream natural hydrograph (beneficial to endangered Snake River salmon spawning, rearing and migration) and maintain a productive reservoir environment for resident fish,

including native bull trout and westslope cutthroat trout. It is assumed that the ecosystem health, diversity and productivity of Dworshak Reservoir has been reduced due to severe seasonal reservoir drawdowns, and that these parameters will improve with less drastic pool fluctuations.

HYPOTHESIS TO BE TESTED:

Operations of Dworshak Dam influences primary productivity.Operations of Dworshak Dam influences zooplankton abundance. Operations of Dworshak Dam influences abundance of benthos.

ALTERNATIVE APPROACHES:

As stated in NPPC Fish and Wildlife Program amendment application 95-2/0042, dated January 25, 1995, there is no known alternative means to achieve the project biological objectives.

JUSTIFICATION FOR PLANNING:

NA

METHODS:

1) Measurement of primary productivity, zooplankton, benthos, nutrients, temperature, and oxygen monthly at six reservoir stations to capture longitudinal variations. Monitor phytoplankton, zooplankton and nutrients below Dworshak Dam and relate to operations. Methods: primary production via 14C liquid scintillation; zooplankton via 130-150 micron mesh (size 10) with pygmy flow meter; benthos via 23 X 23 cm Ponar grab sampler with boom/electric winch; temperature/oxygen via YSI Model 50B meter; nutrients via Standard Methods. Water transportation via 22-foot Weldcraft welded aluminum boat with 150 hp Mercury outboard.
2) Computer algorithms for model simulations.
3) Primary fish species affected: bull trout, westslope cutthroat trout, kokanee and smallmouth bass.

PLANNED ACTIVITIES

SCHEDULE:

Planning Phase **Start** 1/97 **End** 12/99 **Subcontractor** partial

Task Data summary for application of accumulated data to biological/integrated rule curve development. Biological/integrated rule curve formulation. Project activities for 1998-2001 will be reduced to focusing on monitoring at one in-reservoir site in the Dworshak Reservoir forebay and one site below Dworshak Dam.

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

The schedule may be influenced by the amount of effort required to caliabrate the rule curve modeling effort to compensate for unforeseen influences on reservoir dynamics. Additional data needs for calibration or other purposes may extend the planning phase. The budget may be influenced by inflation of costs of goods and services and the costs of modeling subcontractors. Listing of weak native stocks (e.g., bull trout and westslope cutthroat trout) would increase ESA coordination costs and could increase the cost of fish sampling methodologies.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

Application of a biological/integrated rule curve for Dworshak Dam and Reservoir that will result in conservation/enhancement of baseline (yet to be determined) primary productivity, zooplankton productivity and benthic productivity; rearing habitat and food resources for the conservation of bull trout and westslope cutthroat trout within the North Fork Clearwater Basin; a stable population of kokanee at 30-50 age-2 kokanee/hectare; successful natural reproduction of smallmouth bass; a target PSD of 30 and relative weight of 100 for smallmouth bass.
2) Impact assessment model to simulate biological impacts associated with alternative operations.

Present utilization and convservation potential of target population or area:
State of Idaho fishing regulations presently prohibit harvest of bull trout in Dworshak Reservoir. Present harvest of westslope cutthroat trout is less than 100 fish.

Assumed historic status of utilization and conservation potential:
NA. Dworshak Reservoir did not exist in an historic sense.

Long term expected utilization and conservation potential for target population or habitat:
The long-term desired utilization potential for self-sustaining bull trout is 500-1,000 fish annually for Dworshak Reservoir proper. The long-term conservation potential for catch and release fishing is .5-.75 fish/hr. The long-term desired utilization potential for a supplemented westslope cutthroat trout fishery is >20,000 fish annually. A long-term conservation target for catch and release fishing is 1.0 fish per hour for self-sustaining native westslope cutthroat trout.

Contribution toward long-term goal:
Rearing habitat and food resources to sustain target populations of bull trout, westslope cutthroat trout, kokanee and smallmouth bass.

Indirect biological or environmental changes:
Additional food for wildlife (e.g., bald eagles, osprey, black bear, otter) that directly utilize fish from Dworshak Reservoir. Reduced erosion of the denuded Dworshak Reservoir shoreline. Reestablishment of the native redside shiner as an important forage species. A normative hydrograph to benefit spawning, rearing and migrating endangered salmon. Fuller summer pools for recreationists and log transportation.

Physical products:
17,090 acres of reservoir habitat enhanced

Environmental attributes affected by the project:
Dam discharges (flow), downstream water temperature, pool level, access to campsites around Dworshak Reservoir.

Changes assumed or expected for affected environmental attributes:
Naturalized dam discharges (with less ramping) ,less downstream water temperature fluctuation, more stable pool level, better access to campsites around Dworshak Reservoir.

Measure of attribute changes:
17,090 acres of reservoir habitat enhanced

Assessment of effects on project outcomes of critical uncertainty:
Monitoring and evaluation of identified quantified biological objectives.

Information products:
Monitoring and evalution of reservoir primary productivity, secondary productivity (zooplankton and benthos), smallmouth bass relative weights/PSD, creel survey, relative abundance assessments of target populations.

Coordination outcomes:
Coordinate with FCRPS management entities (FPAC, TMT, IT, ECOM) in pre-season, in-season, and post-season analyses and approaches relative to Dworshak Reservoir operations. Coordinate with sate, federal and tribal resident fish managers in approaches to rebuild weak native stocks (e.g., bull trout and westslope cutthroat trout).

MONITORING APPROACH
The region should measure the project's biological and environmental outcomes via pre- and post-rule curve monitoring and analy

zing trends of measured parameters. Monitor phytoplankton, zooplankton and nutrients below Dworshak Dam and relate to operations. Monitoring and evalution of reservoir primary productivity, secondary productivity (zooplankton and benthos), smallmouth bass relative weights/PSD, creel survey, relative abundance assessments of target populations. Methods: primary production via 14C liquid scintillation; zooplankton via 130-150 micron mesh (size 10) with pygmy flow meter; benthos via 23 X 23 cm Ponar grab sampler with boom/electric winch; temperature/oxygen via YSI Model 50B meter; nutrients via Standard Methods. Relative fish abundances via variable mesh experimental gill nets. Water transportation via 22-foot Weldcraft welded aluminum boat with 150 hp Mercury outboard.
2) Computer algorithms for model simulations.
3) Primary fish species affected: bull trout, westslope cutthroat trout, kokanee and smallmouth bass.

Provisions to monitor population status or habitat quality:
Personnel, basic equipment, and subcontracting expertise are in place to conduct fish population and habitat monitoring. as described (Item 102) above.

Data analysis and evaluation:
Monitored parameters will be evaluated with reference to modeled (predicted) outcomes and trend analysis, including analysis relative to fishery and fish population data collected since 1972.

Information feed back to management decisions:
Timely feed back to management decisions will occur via ongoing fora for FCRPS operations (i.e., FPAC, TMT, IT, EXCOM).

Critical uncertainties affecting project's outcomes:
Via monitoring and evaluation activities, as described above (Item 102).

EVALUATION
Biological/integrated rule curve formulation, rule curve implementation, substantive and influential participation in the FCRPS management process (FPAC, TMT, IT, EXCOM), positive trend in monitor/evaluation parameters (primary production, secondary production, fish populations, etc.), reduced entrainment of zooplankton.

Incorporating new information regarding uncertainties:
Via monitoring and evaluation activities, as described above (Item 102), and appropriate modification oif these activities.

Increasing public awareness of F&W activities:
Personal contact with recreationists at Dworshak Reservoir is common. Interaction with the public on these occasions, relative to project activities, increases public awareness. Presentations to professional (AFS) and local organizations (i.e., Kiwanis, Rotarians, etc.) have also been used to increase public awareness.

RELATIONSHIPS

RELATED BPA PROJECT	RELATIONSHIP
9501600 Genetic Inventory Westslope Cutthroat Trout	This NPT sponsored project addresses the conservation of native westslope cutthroat trout genetics in the North Fork Clearwater Basin, and its relationship to Dworshak Reservoir fish stocking strategies.
8709900 Dworshak Dam Impacts Assessment	This IDFG sponsored project involves investigation of kokanee entrainment losses relative to Dworshak operations. Kokanee entrainment and reservoir habitat productivity are both important components of Dworshak fishery management, and both are affected by operations.

RELATED NON-BPA PROJECT	RELATIONSHIP

Dworshak Resident Fish Mitigation Review/USACE	The USACE is funding the Universityof Idaho to review the efficacy of current resident fish mitigation (rainbow trout stocking) funded by the USACE pursuant to the original USFWS Coordination Act Report.

OPPORTUNITIES FOR COOPERATION:
The Northwest Power Planning Council must approve adoption of the rule curve for implementation. The Corps of Engineers and the Bonneville Power Administration would need to follow the Council's decision. The National Marine Fisheries Service would need to apply adaptive management principles in its recovery efforts for endangered Snake River chinook and sockeye salmon. Modifications to the original legislative authorization for Dworshak Dam and Reservoir may need to be modified.

COSTS AND FTE

1997 Planned: $143,400

FUTURE FUNDING NEEDS:

FY	$ NEED	% PLAN	% IMPLEMENT	% O AND M
1998	$175,000	100%		
1999	$200,000	100%		
2000	$200,000	100%		
2001	$180,000	100%		
2002	$175,000	100%		

PAST OBLIGATIONS (incl. 1997 if done):

FY	OBLIGATED
1987	$111,517
1988	$109,783
1989	$145,829
1990	$106,593
1994	$159,969
1995	$10,000
1996	$172,554
1997	$143,392
TOTAL:	$959,637

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

OTHER NON-FINANCIAL SUPPORTERS:
Montana Department of Fish, Wildlife & Parks, Idaho Department of Fish & Game, Corps of Engineers, Washington State Water Research Center

LONGER TERM COSTS: 200,000
Continued implementation, including M&E.

1997 OVERHEAD PERCENT: 29.5%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:
Applies to Personnel and Operating Costs only.

SUBCONTRACTOR FTE: .2

SUPPLEMENTAL RESIDENT FISH EVALUATION FACTORS:
This project is within an area blocked by a federally operated dam (Dworshak Dam - USACE), mitigates for resident losses, and addresses weak stocks of bull trout and westslope cutthroat trout. Biological objectives have been identified via the CBFWA MYIP process.